# United States Patent [19]

**Mitchell et al.**

[11] **Patent Number: 4,501,637**

[45] **Date of Patent: Feb. 26, 1985**


[54] **LED HAVING SELF-ALIGNED LENS**


[75] Inventors: **Curtis W. Mitchell**, Phoenix; **Howard M. Berg**, Scottsdale, both of Ariz.

[73] Assignee: **Motorola, Inc.**, Schaumburg, Ill.



[21] Appl. No.: **573,999**

[22] Filed: **Jan. 26, 1984**

**Related U.S. Application Data**

[62] Division of Ser. No. 272,822, Jun. 12, 1981.

[51] **Int. Cl.**[3] ..... **B44C 1/22**; C03C 15/00; C03C 25/06; B29C 17/08

[52] **U.S. Cl.** ..... **156/630**; 29/569 L; 156/633; 156/644; 156/655; 156/668

[58] **Field of Search** ..... 357/17, 19; 29/569 L; 350/96.20, 417; 156/629, 630, 633, 644, 655, 656, 659.1, 668



[56] **References Cited**

U.S. PATENT DOCUMENTS

4,307,935 12/1981 Monnier ..... 350/96.20

FOREIGN PATENT DOCUMENTS

56-46574 4/1981 Japan ..... 357/19



*Primary Examiner*—William A. Powell

*Attorney, Agent, or Firm*—Paul F. Wille



[57] **ABSTRACT**

A relatively thick ring of polymer or metal encircles the emitting area of a light emitting diode. A spherical lens rests on the ring and is both accurately located with respect to and spaced from the emitting area.


**3 Claims, 4 Drawing Figures**